

OBSERVATIONS ON THE LIFE HISTORY OF *MERACANTHA CONTRACTA* (BEAUV.).

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Early in the spring of 1913, while searching for the larvæ of *Trichophorus* (*Ludius* Latr.) about the bases of very much decayed stumps on the top of the South Mountain Range near Wolfsville, Md., I found many of the oddly shaped larvæ of this beetle. This larva is very unique, being the only North American Tenebrionid with the ninth abdominal segment so formed. Candèze figures<sup>1</sup> a very similar larva, which he determines as the larva of *Tenebrion* sp., from Ceylon which, he states, lives under sod. The species is very common and the larva has been recognized since 1849 when S. S. Haldeman<sup>2</sup> briefly but lucidly described it under the name *Physocoelus inflatus* Dej. which name he later<sup>3</sup> referred to synonymy under *Helops contractus* (Beauv.). An editorial note in the *American Entomologist*<sup>4</sup> refers to this larva as being found in the stomach of a bluebird. More recently, H. F. Wickham<sup>5</sup> has given a much more detailed description with several figures of this larva.

*Larva:* (Pl. 4, Figs. a-j.) The body is elongate, cylindrical; tegument highly chitinized, very sparsely beset with long fine yellow hairs; color reddish brown, paler ventrally and posterior margins of segments darker. Head globular, bent downward, mouth directed forward and downward; a pair of large inconspicuous ocelli near base of antennæ; front convex, finely and sparsely punctate, exterior angles produced into broad lateral lobes to antennal area, frontal sutures strongly curved outward; epicranial suture moderately long. Post-labrum<sup>6</sup> transversely oblong, distinct and slightly produced, post labial suture pronounced, anterior and posterior margins parallel, anterior third membranous. Labrum distinct, semicircular in outline, anterior edge slightly truncate and beset with strong bristles. Mandibles (Figs. d, f, g) stout but not exceptionally long, trifaced pyramidal; outer face convex with a convex disc shaped area impressed on basal half, a few slight transverse sulci, and a strong bristle near middle beyond impressed

<sup>1</sup> Histoire des Metamorphoses de quelques Coleoptères Exotiques, p. 79, pl. VI, fig. 11 and 11a.

<sup>2</sup> Proc. Amer. Assn. Adv. Sci., Vol. II, p. 347. 1849.

<sup>3</sup> Proc. Acad. Nat. Sci. Philadelphia, V, p. 5. 1850.

<sup>4</sup> Amer. Ent., Vol. III, p. 201. 1880.

<sup>5</sup> Journ. New York Ent. Soc., IV, p. 119-121.

<sup>6</sup> This term was first used by Lyonet in his "Traite anatomique de la Chenille qui ronge le Bois de Saule. A la Haye, ed. 2, 1862," and seems very appropriate.

area; dorsal face slightly concave; inner face concave with three stout blunt teeth on dorsal edge and one similar tooth on ventral edge, these teeth are all beyond the outer third of the mandible; molar area (Fig. d, 1) strongly produced, obliquely quadrate and concave, with outer ventral edge drawn out into a stout tooth, concave surface transversely carinate. Gula (e, 11) trapeziform; submentum (e, 3) broad, hexagonal; mentum (e, 2) trapeziform with narrower edge directed posteriorly, as long as submentum but narrower and bearing a pair of bristles at base; labium (e, 1) roughly pentagonal smaller than mentum; ligula pronounced and armed with a pair of short spines; labial stipes (e, 10) moderately large; labial palpi (e, 9) two jointed, joint one short and broader than long, joint two equal in length to one but only as wide as long. Maxillæ large; articulating membrane (e, 4) between submentum and cardo slightly chitinized, quite large; cardo (e, 5), large, triangular; maxillary stipes (e, 6) large; maxillary palpi (e, 8) three jointed; lacinea (e, 7) broad and armed with two rows of broad short spines. Hypopharyngeal chitinization (Fig. b) tricuspid, with surface concave, highly chitinized. Antennæ (Fig. c) situated at base of mandibles, three jointed, basal membrane large protuberant slightly chitinized, joint one nearly as broad as long slightly widened distally, joint two clavate, twice as long as wide, surmounted with a cushion like membranous cap on which is situated a small disc like antennal appendage and the small third joint; third joint less than one-fifth length of second joint, cylindrical, one-third as wide as long, bears two small hairs; antennæ slightly retractile. First thoracic segment as long as broad, anterior margin finely striate; second about one-half as long as first and third a little longer than second. Legs (Fig. i) moderately long, coxa as long as femora and trochanter taken together, scoop shaped with concave membranous surface to receive femora when in repose, edges of this surface beset with hairs; trochanter large, triangular and serving as a support for femora, over the inner two-thirds of which it is prolonged; femora stout and short; tibia equal to femora in length but more slender; tarsus unguiform, in length almost equal to tibia; femora and tibia with stout spines on inner edge. Mesothoracic spiracle oval and twice as long as the abdominal spiracles. Ten abdominal segments, one to eight about equal in diameter and length, posterior borders strongly deflexed but not striate, dorsal surface sparsely and finely punctate and slightly transverse-rugose, rugosity becoming more pronounced and punctation more dense and coarse caudad; ninth abdominal segment (Fig. j) obliquely truncate, truncate surface strongly concave with acute margins; tenth abdominal segment (Fig. h) in small semi-circular orifice on basal quarter of venter of ninth abdominal segment and bearing two mammiform papillæ. Spiracular area of segments one to eight (Fig. h) oblong, with small almost circular spiracles on anterior dorsal margin. Length 27 mm.

The nidus in which I found these larvæ was composed of deep leaf mould and decayed wood. They seemed very sensitive to light and very rapidly burrowed away when unearthed. Several were collected and placed in rearing cages. Three days later (May 5) three of the larvæ had pupated. The last larval exuvia were preserved for future identification of this species of larva.

*Pupa*: (Fig. I.) Free: arcuate; cream colored with ferruginous tinge on pronotum; femora, tibia, head, and tarsi fuscate. Just before emerging the pupa becomes much more strongly colored. Head bent strongly venterad; maxillary palpi very prominent, securiform; eyes almost black. Tips of wing cases extend slightly beyond the anterior margin of second abdominal segment. Metatarsi almost attain posterior margin of fifth abdominal segment. Posterior margin of metanotum bears a pair of highly chitinized black securiform protuberances which are opposed by a pair of black, chitinized, concave, areas on the anterior margins of the first abdominal segment. First to fifth abdominal segments bearing on sides

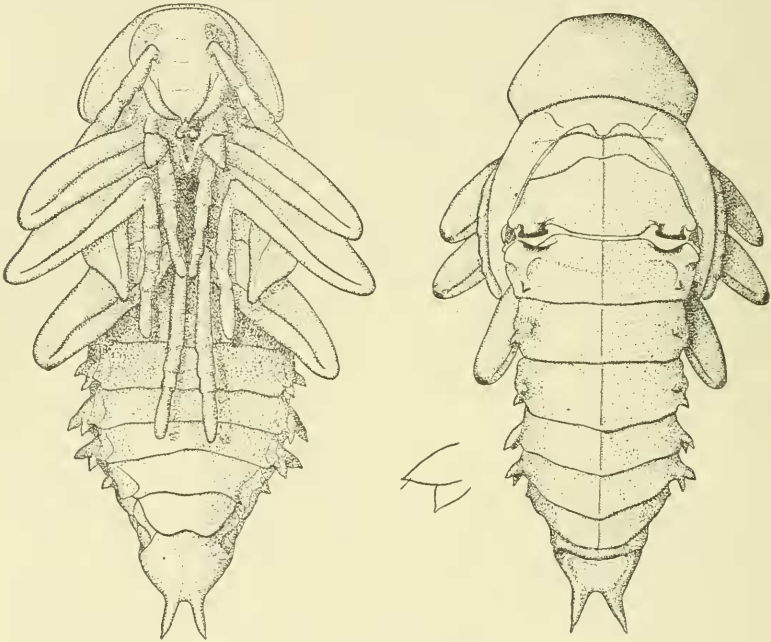


Fig. 1. *Meracantha contracta*. Pupa.

of tergites two-lobed protuberances, lobes pointed and anterior one directed upward on first to third segment; sixth segment bears a one-lobed protuberance; seventh segment small, and very narrow dorsally; eighth segment ending in a pair of slightly divergent simply pointed processes. Dorsal surface of eighth segment slightly concave. Length 15 mm.

A fourth individual was about half transformed to a pupa when it was attacked and killed by the larva of a Coleopteron that I have not had determined. The predaceous larva was white in color and very much flattened dorso ventrally, and was placed in

the cage with the *Meracantha* while collecting. It killed its host by eating into the thorax. Two weeks after pupation the first adult emerged. When first transformed it was quite uniformly cream white; the legs and pronotum soon became infusate, then brown and were followed by the elytra becoming darker. Finally the entire beetle assumed the bronze black color of the mature imago.

One of the larvæ that pupated on May 5 did not decay, as did the other pupæ that failed to become beetles, and on June 14 a Bombyllid fly, *Anthrax alternata* Say.,<sup>1</sup> emerged from it. The pupa of this parasite is quite active just prior to the emergence

of the adult. It is provided with a row of backwardly directed spines on the dorsum of each abdominal segment, and the dorsum of the terminal segment bears four stout spines and is terminated by a pair of prongs (Fig. IIId). By alternately flexing the body forward and backward, the spines preventing any backward movement of the sclerites, the pupa moves forward. It pushed off the prothorax and head of its host pupa (Fig. IIc) and protruded from the opening thus formed (Fig. IIa) until the adult parasite emerged.

The head capsule of *Anthrax* (Fig. IIb) is armed with three pair of stout teeth which probably assist in the act of emerging from the host. The adult *Anthrax*

emerged from its chrysalis by forcing off the pupal head capsule and splitting the dorsum of the pronotum. How this parasite locates the larvæ of *Meracantha*, which never come above ground as far as I have observed, where she oviposits, and the period the parasite spends within its host still remains to be determined.

In August of the same year I again made observations on *Meracantha contracta*. On this occasion I was collecting the larvæ of *Sericosomus viridanus* Say. from under the moss, *Pcly-trichum ohioensis*, on the top of the same mountain range but near

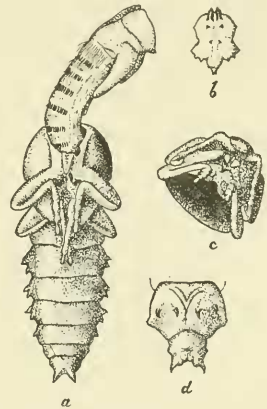


Fig. 2. *Meracantha contracta*. Pupal case and pupal case of parasite, *Anthrax alternata*.

<sup>1</sup> Determined by Mr. W. R. Walton.

Myersville, Md. Living *Meracantha* larvæ were found though, from the cast larval skins and dead larvæ, they must have been much more numerous earlier in the season. In four distinct cases I found the empty skins of the Tenebrionid larva with one or two *Tachinid* puparia close by. In every case, however, the parasites had emerged. A number of these puparia were collected and later observations proved them to be of a *Neopales* sp. n.<sup>1</sup>

On November 21 I made my last trip to the mountains for that season. At the same spot, where I collected the *Neopales* puparia in August, I collected several larvæ of *Meracantha*. The larvæ were placed in rearing cages and passed the winter in this stage. On May 23, 1914, the cage was examined and one of these larvæ was found to have pupated, the adult emerging six days later. Another larva pupated between May 25 and May 27, and from this pupa the adult emerged on June 5. From our observations we conclude that the pupal stage of this beetle endures from ten to fourteen days.

Two larvæ from the same material were killed by *Neopales* and, on May 23, a parasite larva emerged from each host larva and pupated. The adult *Tachinid* emerged on June 4, which limits the puparium stage to twelve days. This *Tachinid* must pass the winter within its host.

#### EXPLANATION OF PLATE 4.

*Meracantha contracta* (Beauv.), larva and details.

- Fig. a, Dorsal aspect.  
 b, Hypopharyngeal chitinization.  
 c, Antennæ.  
 d, Left mandible, inner face, 1, molar area.  
 e, Labium and maxillus. 1, labium; 2, mentum; 3, submentum; 4, articular membrane between submentum and cardo; 5, cardo; 6, maxillary stipes; 7, lacinæ; 8, maxillary palpus; 9, labial palpus; 10, labial stipes; 11, gula; 12, ligula.  
 f, Left mandible, dorsal face.  
 g, Left mandible, outer face.  
 h, Seventh, eighth, ninth, and tenth abdominal segments, ventral aspect.  
 i, Left mesothoracic leg.  
 j, Ninth abdominal segment, lateral aspect.

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